



National innovation systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: A critical review of the literature



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ABSTRACT

Developed over the past three decades, the national innovation system concept (NIS) has been widely used by both scholars and policy makers to explain how interactions between a set of distinct, nationally bounded institutions supports and facilitates technological change and the emergence and diffusion of new innovations. This concept provides a framework by which developing countries can adopt for purposes of catching up. Initially conceived on structures and interactions identified in economically advanced countries, the application of the NIS concept to developing countries has been gradual and has coincided – in the NIS literature – with a move away from overly macro-interpretations to an emphasis on micro-level interactions and processes, with much of this work questioning the nation state as the most appropriate level of analysis, as well as the emergence of certain intermediary actors thought to facilitate knowledge exchange between actors and institutions. This paper reviews the NIS literature chronologically, showing how this shift in emphasis has diminished somewhat the importance of both institutions, particularly governments, and the political processes of institutional capacity building. In doing so, the paper suggests that more recent literature on intermediaries such as industry associations may offer valuable insights to how institutional capacity building occurs and how it might be directed, particularly in the context of developing countries where governance capacities are often lacking, contributing to less effective innovation systems, stagnant economies, and unequal development.

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1. Introduction

Innovation, understood as the recombination of existing ideas or the generation of new ideas into new processes and products (Freeman and Soete, 1997; Gordon and McCann, 2005) is widely viewed as the main driver of growth in modern capitalistic economies (Rodríguez-Pose and Crescenzi, 2008). Further this, Metcalfe and Ramlogan (2008: 436) state that “successful economic development is intimately linked to a country’s capacity to acquire, absorb, disseminate, and apply modern technologies, a capacity embodied in its NIS [National Innovation System]”. In most accounts, the NIS concept is described as that set of national institutions which contribute to generation and diffusion of new technologies and which provide the framework within which government and firms negotiate policies to influence the innovation process (Metcalfe, 1997).

Although notions of technological ‘catch-up’ and economic growth have always been central to the NIS concept (see Lundvall, 2007), the idea was conceived on institutional structures and activities identified in already developed countries (e.g., Japan, USA, Germany, Sweden) with developing countries largely absent from the early literature. Shortly thereafter, the NIS concept was applied to so-called newly industrialised countries (e.g., South Korea, Taiwan, and Singapore) and countries of Latin America (e.g., Mexico and Argentina), and has, more recently, been applied to developing countries, both the emerging powers of Brazil, India, China, and South Africa, and more limitedly to less developed countries in Sub-Saharan Africa and elsewhere (Metcalfe and Ramlogan, 2008). The gradual inclusion of developing countries within the NIS discussion has coincided with several interrelated shifts in the NIS literature occurring over the past three decades: (1) a move away from macro institutional explanations to a focus on specific system processes, (2) a more recent emphasis on the role of intermediary and non-governmental actors in this regard, and (3) the increasing internationalisation of the NIS concept. While these shifts illuminate important and complex processes of knowledge exchange

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and diffusion at different levels of analysis, they also lay bare the long-standing omission, within the NIS literature, of the political processes through which governments are informed and by which relations between government and industry exert influence on the NIS.

In providing a comprehensive review of the NIS literature over time, the aim of this paper is to explain these conceptual shifts and their implications in relation to a parallel yet increasingly intersecting body of work on the role of intermediaries (see [Smits and Kuhlman, 2004](#)), including member based organisations such as industry associations in knowledge and technology diffusion. In doing so, we suggest that an emerging emphasis on such intermediaries in developing countries offers valuable insight on linkages between the often disconnected processes – within the NIS literature – of technology creation and diffusion and political processes of institutional capacity building and governance; thus reasserting politics of development into notions of national innovation systems and its application as a framework for policy.

We define industry associations as member-based organisations that represent the interests of a particular industry and actively lobby and negotiate with government on their member's behalf to shape government policy and regulation. Also included are business umbrella groups such as chambers of commerce who represent to government the broad interests of a number of industries and sectors, with industry associations often members of these groups. We suggest that these organisations are part of what [Sabatier \(1988,1991\)](#) describes as the “policy subsystem” comprised of intermediary bodies involved in aggregation processes (see [Rip and Van der Meulen, 1996](#)): “i.e., those actors from a variety of public and private organisations who are actively concerned with a policy problem or issue. ... and who regularly seek to influence policy in that domain” ([Jenkins-Smith and Sabatier, 1994: 179](#)). We argue that this policy subsystem and the various intermediary political actors therein, particularly industry associations, have been largely neglected in the NIS literature. This omission is important when applying the NIS concept to developing countries where institutional capacities for innovation will often be lacking ([Frankel, 2006](#)), and where their potential development will be the result of politically contested relations between government, industry, and civil society. Furthermore, these are likely to involve considerable negotiation between local and global interests (e.g., international bodies and multinational companies – MNCs). In this context, we suggest, as [Kshetri and Dholakia \(2009\)](#) argue, that industry associations will likely play a leading role in bridging institutional knowledge gaps between government and industry, and between the local and the global.

This paper is structured chronologically, although there is considerable overlap between the approaches and themes presented here. For each proceeding section, the identified shifts in the NIS literature are described, with each section explaining the main conceptual arguments proposed, the ways by which intermediary actors are considered, and the extent to which developing countries are included. Section 2 reviews early concepts of NIS, revealing the main institutional actors, the early emergence of intermediaries, and the predominant focus on industrialised countries of the global North. Section 3 examines a second wave of NIS literature, identifying new conceptual boundaries and micro-level process dynamics, the identification of industry associations as important intermediary actors, and the growing application of the NIS concept to developing countries. Section 4 focuses on the more recent move of NIS literature towards internationalisation of the NIS approach, showing the increasing emphasis of global knowledge flows, and on intermediary institutional actors such as industry associations in this regard, particularly in the developing country context. Section 5 concludes by summarising the three major shifts in the literature of NIS and their significance for conceptualising the role of indus-

try associations in innovation of developing countries in the global South.

2. NIS: early concepts and approaches

Derived in part from the ideas of [List \(1841\)](#) and his concept of national systems of production, the NIS concept was first proposed by [Freeman \(1982, 1987\)](#) as a response to the Washington consensus and to the neoclassical approaches to growth. In this way, the NIS concept has always been intrinsically linked to public policy ([Sharif, 2006](#)). Drawing on the work of [Nelson and Winter \(1982\)](#) and their Schumpeterian inspired theory of economic growth through evolutionary technological change, Freeman, along with [Lundvall \(1985, 1988\)](#) and again [Nelson \(1988,1990\)](#), argued that neoclassical growth models are inadequate as they ignored the role that technological change and innovation play, particularly in economies that are science and technology driven and which are increasingly shaped by competitive global forces. For Freeman and others, technological change and innovation are central to economic growth – a notion Freeman pointed to as obvious since the industrial revolution and already well established by [Schumpeter \(1939,1942\)](#). Furthermore, innovation, in this view, is understood as not only the work of individual firms, but as a collective endeavour, requiring diverse and substantive sets of knowledge, resources and expertise. As such, different countries will have different institutional capacities for innovation ([Patel and Pavitt, 1994](#)). Unlike the neoclassical view of growth, therefore, the NIS concept argues that governments and collective activities can and do play a central orchestrating role in the generation and diffusion of innovation in a national economy. [Freeman \(1988,1987\)](#) made this point quite clear in his analysis of Japan's post-war ‘catching up’ policy. In other words, institutions matter: they can create and support an environment through which collective knowledge and resources can be more easily exchanged for the pursuit of new ideas and opportunities, in what are increasingly complex and inherently uncertain enterprises ([Freeman and Soete, 1997](#)).

2.1. Institutional actors and interactive learning

Early work on the NIS concept set out to first identify the institutions and system interactions that characterise economically successful countries (OECD countries in particular). As an institutional construct, the core institutions comprising the NIS identified in the early literature are (1) governments and related agencies supporting innovation through regulation, standard setting, public-private partnerships, and funding of basic research, (2) sectors and industries comprised of firms which generate commercial innovations through experimentation, R&D, and product improvement, (3) universities which conduct basic research and train a technical and scientific workforce, and (4) other public and private organisations that engage in education oriented activities ([Patel and Pavitt, 1994](#)). Key to this structure are interactions within and between institutions which [Lundvall \(1992\)](#) and others describe as a variety user-producer linkages that facilitate information sharing leading to cumulative knowledge and collective learning – learning by doing as [Arrow \(1962\)](#) described, being central to both innovation and institutional capacity building. The NIS concept also draws upon other ideas from innovation theory that posits learning and subsequent innovation as a non-linear and recursive process that relies on effective feedback loops between actors and institutions – recursively informing stages of invention, research and development, and commercialisation (e.g., early marketing and product testing informing product development efforts) (see [Nelson and Winter, 1982](#)). In this way, the NIS concept places considerable emphasis on the evolutionary and path dependent nature of tech-

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